

PATENT

Attorney Docket No.: AMAT/8764.P1/FEP/OXD/JW

Express Mail No.: EV335470966US

What is claimed is:

1. A method of processing a substrate, comprising:
depositing a layer comprising amorphous carbon on the substrate; and then
exposing the substrate to electromagnetic radiation have one or more
wavelengths between about 600 nm and about 1000 nm under conditions sufficient
to heat the layer to a temperature of at least about 300°C.
2. The method of claim 1, wherein the exposing the substrate to electromagnetic
radiation comprises laser annealing the substrate.
3. The method of claim 2, wherein the laser annealing comprises focusing
continuous wave electromagnetic radiation into a line extending across a surface of
the substrate.
4. The method of claim 1, wherein the electromagnetic radiation is provided by a
lamp.
5. The method of claim 1, wherein the layer comprising amorphous carbon is
deposited by plasma enhanced chemical vapor deposition.
6. The method of claim 1, further comprising removing the layer from the
substrate after the exposing the substrate to electromagnetic radiation.
7. The method of claim 1, further comprising implanting dopant ions into the
substrate before the depositing a layer comprising amorphous carbon.
8. The method of claim 7, wherein the substrate is exposed to the
electromagnetic radiation for a period of time sufficient to activate the implanted
dopant ions.

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9. A method of processing a substrate, comprising:

depositing a layer comprising amorphous carbon and a dopant selected from the group consisting of nitrogen, boron, phosphorus, fluorine, and combinations thereof on the substrate; and then

exposing the substrate to electromagnetic radiation have one or more wavelengths between about 600 nm and about 1000 nm under conditions sufficient to heat the layer to a temperature of at least about 300°C.

10. The method of claim 9, wherein the exposing the substrate to electromagnetic radiation comprises laser annealing the substrate.

11. The method of claim 10, wherein the laser annealing comprises focusing continuous wave electromagnetic radiation into a line extending across a surface of the substrate.

12. The method of claim 9, wherein the electromagnetic radiation is provided by a lamp.

13. The method of claim 9, wherein the dopant is nitrogen.

14. The method of claim 9, wherein the layer is deposited at a temperature between about 250°C and about 450°C.

15. The method of claim 9, wherein the layer is deposited by plasma enhanced chemical vapor deposition.

16. The method of claim 9, further comprising removing the layer from the substrate after the exposing the substrate to electromagnetic radiation.

17. The method of claim 9, further comprising implanting dopant ions into the substrate before the depositing a layer comprising amorphous carbon.

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18. The method of claim 17, wherein the substrate is exposed to the electromagnetic radiation for a period of time sufficient to activate the implanted dopant ions.

19. A method of processing a substrate comprising silicon, the method comprising:

depositing a layer having a thickness of between about 200 Å and about 2.5 µm under conditions sufficient to provide the layer with an emissivity of about 0.84 or greater for electromagnetic radiation having a wavelength of between about 600 nm and about 1000 nm; and then

laser annealing the substrate.

20. The method of claim 19, wherein the layer comprises amorphous carbon.

21. The method of claim 20, wherein the layer further comprises a dopant selected from the group consisting of nitrogen, boron, phosphorus, fluorine, and combinations thereof.

22. The method of claim 20, wherein the layer further comprises nitrogen.

23. The method of claim 19, wherein the layer has a thickness of between about 800 Å and about 1500 Å, and the layer is deposited under conditions sufficient to provide the layer with an emissivity of about 0.84 or greater for electromagnetic radiation having a wavelength of between about 808 nm and about 810 nm.

24. The method of claim 19, wherein the laser annealing comprises focusing continuous wave electromagnetic radiation into a line extending across a surface of the substrate.

25. The method of claim 19, further comprising implanting dopant ions into the substrate before the depositing a layer comprising amorphous carbon.
26. The method of claim 25, further comprising forming a gate source area and a gate drain area in the substrate before the implanting.
27. The method of claim 26, wherein the substrate is laser annealed for a period of time sufficient to activate the implanted dopant ions.
28. A substrate, processed by a method comprising:
depositing a layer comprising amorphous carbon on the substrate; and then
exposing the substrate to electromagnetic radiation have one or more wavelengths between about 600 nm and about 1000 nm under conditions sufficient to heat the layer to a temperature of at least about 300°C.
29. The method of claim 28, wherein the exposing the substrate to electromagnetic radiation comprises laser annealing the substrate.
30. The substrate of claim 29, wherein the laser annealing comprises focusing continuous wave electromagnetic radiation into a line extending across a surface of the substrate.
31. The method of claim 28, wherein the electromagnetic radiation is provided by a lamp.
32. The substrate of claim 28, wherein the layer further comprises a dopant selected from the group consisting of nitrogen, boron, phosphorus, fluorine, and combinations thereof.
33. The substrate of claim 28, wherein the layer further comprises nitrogen.

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34. The substrate of claim 33, wherein the layer has an emissivity of about 0.84 or greater for electromagnetic radiation having a wavelength of between about 808 nm and about 810 nm.

35. The substrate of claim 28, wherein the method further comprises implanting dopant ions into the substrate before the depositing a layer comprising amorphous carbon.

36. The substrate of claim 35, wherein the substrate is exposed to the electromagnetic radiation for a period of time sufficient to activate the implanted dopant ions.